UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/676,727	09/29/2000	Francis X. Canning	CANNING.001A	2872

20995 7590 06/16/2005

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
DAY, HERNG DER	

ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/676,727	CANNING, FRANCIS X.	
	Examiner	Art Unit	
	Herng-der Day	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 November 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/10/01, 11/12/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicant's Amendment ("Amendment") to Office Action dated August 12, 2004, mailed November 12, 2004

1-1. Claims 1, 2, 10, 12, 23, and 28 have been amended. Claims 1-33 are pending.

1-2. Claims 1-33 have been examined and rejected.

Drawings

2. The replacement drawings of FIG. 1A, FIG. 1B, and FIG. 1C received on November 12, 2004, are acceptable. The objection to the drawings has been withdrawn.

Specification

3. The disclosure is objected to because of the following informalities:

Appropriate correction is required.

3-1. It appears that "$g_1(\ell)$, $g_2(\ell)$, and $g_2(\ell)$", as described in line 15 of page 8, should be "$g_1(\ell)$, $g_2(\ell)$, and $g_3(\ell)$".

3-2. It appears that the "$d\ell d\ell$" at the end of the equation as shown in line 10 of page 9, should be "$d\ell d\ell$"".

3-3. It appears that "$I_1 f(\ell)$", as described in line 12 of page 9, should be "$I_1 f_1(\ell)$".

4. The Examiner thanks Applicant's submitting the SuperNEC publications. However, document 7, "SuperNEC: Parallel MOM User Reference Manual," Version 1.00, Poynting Software (Pty) Ltd., September 21, 1999, in 12 pages, can not be found.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Canning et al., Rockwell Inst. Sci. Center, "Fast Direct Solution of Standard Moment-Method Matrices", IEEE Antennas and Propagation Magazine, June 1998, pages 15-26, hereafter referred to as Rockwell.

6-1. Regarding claim 1, Rockwell discloses a method of data compression, comprising:

partitioning a first set of basis functions into groups, each group corresponding to a region, each basis function corresponding to one unknown in a system of linear equations, each of said basis functions corresponding to an original source (basis functions, page 16, left column, paragraph 1);

selecting a plurality of spherical angles (angle, page 15, right column, the last paragraph);

using a computer system, calculating a far-field disturbance produced by each of said basis functions in a first group for each of said spherical angles to produce a matrix of transmitted disturbances (matrix A, page 15, right column, the last paragraph);

reducing a rank of said matrix of transmitted disturbances to yield a second set of basis functions, said second set of basis functions corresponding to composite sources, each of said composite sources comprising a linear combination of one or more of said original basis functions (the SVD of A, page 16, left column, the last paragraph);

partitioning a first set of weighting functions into groups, each group corresponding to one of said regions, each weighting function corresponding to a condition, each of said weighting functions corresponding to an original tester (testing functions, page 16, left column, paragraph 1);

using a computer system, calculating a far-field disturbance received by each of said testers in a first group for each of said spherical angles to produce a matrix of received disturbances (matrix A, page 15, right column, the last paragraph);

reducing a rank of said matrix of received disturbances to yield a second set of weighting functions, said second set of weighting functions corresponding to composite testers, each of said composite testers comprising a linear combination of one or more of said original testers (the SVD of A, page 16, left column, the last paragraph); and

transforming said system of linear equations to use said composite sources and said composite testers (a fast sparse solution, page 16, left column, the last paragraph).

6-2. Regarding claim 2, Rockwell discloses a method of data compression, comprising:

partitioning a first set of basis functions into groups, each group corresponding to a region, each basis function corresponding to an unknown in a system of equations, each of said basis functions corresponding to an original source (basis functions, page 16, left column, paragraph 1);

selecting a first plurality of angular directions (angle, page 15, right column, the last paragraph);

using a computer system, calculating a disturbance produced by each of said basis functions in a first group for each of said angular directions to produce a matrix of disturbances (matrix A, page 15, right column, the last paragraph);

using said matrix of disturbances to compute a second set of basis functions, said second set of basis functions corresponding to composite sources, wherein at least one of said composite sources produces a relatively weak disturbance from a portion of space around said at least one composite source (the SVD of A, page 16, left column, the last paragraph);

partitioning a first set of weighting functions into groups, each group corresponding one of said regions, each weighting function corresponding to a condition, each of said weighting functions corresponding to an original tester (testing functions, page 16, left column, paragraph 1);

using a computer system, calculating a disturbance received by each of said testers in a second plurality of angular directions to produce a matrix of received disturbances (matrix A, page 15, right column, the last paragraph);

using said matrix of received disturbances to compute a second set of weighting functions, said second set of weighting functions corresponding to composite testers, wherein at least one of said composite testers weakly receives disturbances from a portion of space relative to said at least one composite tester (the SVD of A, page 16, left column, the last paragraph); and

transforming at least a portion of said system of equations to use one or more of said composite sources and one or more of said composite testers (a fast sparse solution, page 16, left column, the last paragraph).

6-3. Regarding claim 3, Rockwell further discloses said matrix of disturbances is a moment method matrix (MoM matrix, page 16, left column, paragraph 3).

6-4. Regarding claim 4, Rockwell further discloses said step of using said matrix of disturbances to compute a second set of basis functions comprises reducing a rank of said matrix of disturbances (the SVD of A, page 16, left column, the last paragraph).

6-5. Regarding claim 5, Rockwell further discloses said step of using said matrix of received disturbances to compute a second set of weighting functions comprises reducing a rank of said matrix of received disturbances (the SVD of A, page 16, left column, the last paragraph).

6-6. Regarding claim 6, Rockwell further discloses said disturbance is at least one of an electromagnetic field, a heat flux, an electric field, a magnetic field, a vector potential, a pressure, a sound wave, a particle flux, a weak nuclear force, a strong nuclear force, and a gravity force (electromagnetic interference, page 15, left column, the last paragraph).

6-7. Regarding claim 7, Rockwell further discloses said first plurality of directions is substantially the same as said second plurality of directions (angle, page 15, right column, the last paragraph).

6-8. Regarding claim 8, Rockwell further discloses said regions of space around said at least one composite source are far-field regions (these regions are not physically close to each other at any point, page 15, right column, the last second paragraph).

6-9. Regarding claim 9, Rockwell further discloses said at least a portion of a region around said at least one composite tester is a far-field region (these regions are not physically close to each other at any point, page 15, right column, the last second paragraph).

6-10. Regarding claim 10, Rockwell discloses a method of data compression, comprising:

calculating one composite source as a linear combination of one basis function, wherein at least one of said composite sources produces a relatively weak disturbance in a portion of space related to said at least one composite source (basis functions, page 16, left column, paragraph 1);

using a computer system, calculating one composite tester as a linear combination of one weighting function, wherein at least one of said composite testers is affected relatively weakly by disturbances propagating from a portion of space around said at least one composite tester (testing functions, page 16, left column, paragraph 1); and

transforming at least a portion of a first system of equations based on said basis functions and said weighting functions into a second system of equations based on said composite sources and said composite testers (a fast sparse solution, page 16, left column, the last paragraph).

6-11. Regarding claim 11, Rockwell further discloses said disturbance is at least one of, an electromagnetic field, a heat flux, an electric field, a magnetic field, vector potential, a pressure, a sound wave, a particle flux, a weak nuclear force, strong nuclear force, and a gravity force (electromagnetic interference, page 15, left column, the last paragraph).

6-12. Regarding claims 12-16, Rockwell further discloses a technique applies not only to antenna and propagation problem, but also to all electromagnetic problems. It can be applied to matrices coming from nearly all integral-equation formulations and other linear wave phenomena (page 15, left column, the last paragraph through right column, paragraph 1).

6-13. Regarding claim 17, Rockwell further discloses each of said composite sources corresponds to a region (region, page 15, right column, the last second paragraph).

6-14. Regarding claim 18, Rockwell further discloses said second system of equations is described by a sparse block diagonal matrix (sparse representation, page 16, left column, paragraph 4).

6-15. Regarding claim 19, Rockwell further discloses comprising the step of reordering said sparse block diagonal matrix to shift relatively larger entries in said matrix towards a desired corner of said matrix (to arrange the singular values in decreasing order, page 17, left column, paragraph 1).

6-16. Regarding claim 20, Rockwell further discloses comprising the step of solving said second system of equations (a fast sparse solution, page 16, left column, the last paragraph).

6-17. Regarding claim 21, Rockwell further discloses comprising the step of solving said second system of equations to produce a first solution vector, said first solution vector expressed in terms of said composite testers (vector, page 18, left column, paragraph 1).

6-18. Regarding claim 22, Rockwell further discloses comprising the step of transforming said first solution vector into a second solution vector, said second solution vector expressed in terms of said weighting functions (orthogonalized version, page 18, left column, paragraph 2).

6-19. Regarding claim 23, Rockwell discloses a method, comprising:

calculating at least one composite source, said composite source representing energy sources (basis functions, page 16, left column, paragraph 1);

using a computer system, calculating at least one composite tester (testing functions, page 16, left column, paragraph 1); and

transforming at least a portion of a first system of linear equations into a second system of linear equations based at least on said at least one composite source and said at least one composite tester (a fast sparse solution, page 16, left column, the last paragraph).

6-20. Regarding claim 24, Rockwell further discloses said at least one composite source represents a linear combination of one energy source such that said at least one composite source radiates relatively little energy into a portion of angular region disposed about said at least one source (the radiated field decays quickly for angles passing through successive sidelobes, page 18, right column, paragraph 1).

6-21. Regarding claim 25, Rockwell further discloses said at least one composite tester is affected relatively weakly by energy propagating from a portion of space around said at least one composite tester (the radiated field decays quickly for angles passing through successive sidelobes, page 18, right column, paragraph 1).

6-22. Regarding claim 26, Rockwell further discloses said second system of linear equations is represented by a block sparse matrix (a sparse yet accurate description of the matrix, page 19, right column, paragraph 2).

6-23. Regarding claim 27, Rockwell discloses an apparatus comprising:

means for calculating at least one composite source (basis functions, page 16, left column, paragraph 1);

means for calculating at least one composite tester (testing functions, page 16, left column, paragraph 1); and

means for transforming at least a portion of a first system of equations into a second system of equations based at least on said at least one composite source and said at least one composite tester (a fast sparse solution, page 16, left column, the last paragraph).

6-24. Regarding claim 28, Rockwell discloses a method of data compression, comprising:

calculating one or more composite sources as a combination of one basis function, wherein at least one of said composite sources produces a relatively weak product in a portion of space (basis functions, page 16, left column, paragraph 1);

using a computer system, calculating one composite tester as a combination of one weighting function, wherein at least one of said composite testers interacts relatively weakly with said at least one composite tester (testing functions, page 16, left column, paragraph 1); and

transforming at least a portion of a first array of interaction data based on said basis functions and said weighting functions into a second array of interaction data based on said composite sources and said composite testers (a fast sparse solution, page 16, left column, the last paragraph).

6-25. Regarding claim 29, Rockwell further discloses said disturbance is at least one of, an electromagnetic field, a heat flux, an electric field, a magnetic field, vector potential, a pressure, a sound wave, a particle flux, a weak nuclear force, strong nuclear force, a gravity force, and an image element (electromagnetic interference, page 15, left column, the last paragraph).

6-26. Regarding claim 30, Rockwell further discloses each of said composite sources corresponds to a region (region, page 15, right column, the last second paragraph).

6-27. Regarding claim 31, Rockwell further discloses said second array of interaction data is described by a sparse block diagonal matrix (sparse representation, page 16, left column, paragraph 4).

6-28. Regarding claim 32, Rockwell further discloses comprising the step of using said second array of interaction data to compute a first solution vector, said first solution vector expressed in terms of said composite testers (vector, page 18, left column, paragraph 1).

6-29. Regarding claim 33, Rockwell further discloses comprising the step of transforming said first solution vector into a second solution vector, said second solution vector expressed in terms of said weighting functions (orthogonalized version, page 18, left column, paragraph 2).

Applicant's Arguments

7. Applicant argues the following:

7-1. Response to Objection to Provisional Under 35 U.S.C. §112

(1) "The terms Method of Moments (MoM), basis and weighting functions, and far-field disturbances are fully supported by the provisional application" (page 11, paragraph 4, Amendment).

7-2. Response to Objection to the Specification under MPEP §310

(2) "The subject of this application was neither conceived nor developed under federally sponsored research and development. The U.S. government has no rights in the present invention. A statement under § MPEP 310 would be improper" (page 11, paragraph 6, Amendment).

7-3. Response to Requirement for a New Oath or Declaration

(3) "Mr. Rogovin did not participate in the conception of the claimed invention and is not a co-inventor" (page 12, paragraph 2, Amendment).

7-4. Response to Rejection of Claim 12 Under 35 U.S.C. §112

(4) "Applicant has amended Claim 12 to correct the antecedent basis for the term 'composite sources'" (page 12, paragraph 5, Amendment).

7-5. Response to Rejection of Claims 1-33 Under 35 U.S.C. 101

(5) "Applicants have amended Claims 1, 2, 10, 23, and 28 to clarify at least portions of the method are performed by an apparatus" (page 12, paragraph 8, Amendment).

7-6. Response to Rejection of Claims 1-33 Under 35 U.S.C. 102(b)

(6) "Rockwell teaches using a known prior-art technique of employing a single SVD rank reduction on a rectangular array of data to compress the array. It was known previously that composite sources and composite testers that are created by a single SVD applied to a given rectangular array of data can then be used to compress that same array of data" (page 13, paragraph 3, Amendment).

(7) "The present application teaches that one can use a first rank reduction on a first set of data to obtain composite sources, and a second rank reduction on a second (and different) set of data to obtain composite testers, and then use these separately-computed composite sources and composite testers together to compress a third set of data. The third set of data is not identical to at least one of the first and second sets of data" (page 13, paragraph 4, Amendment).

(8) Rockwell does not teach or suggest claims 1-33(pages 13-17, Amendment).

Response to Arguments

8. Applicant's arguments have been fully considered.

8-1. Applicant's argument (1) is persuasive. The objection to the Provisional applications in Office Action dated August 12, 2004, has been withdrawn.

8-2. Applicant's argument (2) is persuasive. The objection to the Specification under MPEP §310 in Office Action dated August 12, 2004, has been withdrawn.

8-3. Applicant's argument (3) is persuasive. The objection to Oath/Declaration in Office Action dated August 12, 2004, has been withdrawn.

8-4. Applicant's argument (4) is persuasive. The rejection of claim 12 under 35 U.S.C. 112, second paragraph, in Office Action dated August 12, 2004, has been withdrawn.

8-5. Applicant's argument (5) is persuasive. The rejections of claims 1-33 under 35 U.S.C. 101, in Office Action dated August 12, 2004, have been withdrawn.

8-6. Applicant's arguments (6)-(8) are not persuasive. As described in lines 3-4 of page 15, "Each composite source is typically a linear combination of one or more of the original sources" and in lines 7-8 of page 16, "Composite testers are found in a manner analogous to the way that composite sources are found". Since a composite source or a composite tester could be a linear combination of one original source or one original tester, the composite source or the composite tester is not distinguishable from the original source or the original tester. Therefore, Rockwell's disclosure meets all the claimed limitations.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

Reference to Kapur et al., U.S. Patent 6,064,808 issued May 16, 2000, and filed August 1, 1997, is cited as disclosing a method which extracts the parameter through the use of a matrix generated by a MoM representation.

10. **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30. Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Jean R. Homere can be reached on (571) 272-3780. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day
June 13, 2005 H.D.

Thai Phan
Patent Examiner
AU: 2128